Achieving Water Quality Improvement Through Implementation at the Local Level

Plenary Session 1

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Overview

- Looking at successful local projects: was there a plan involved?

- Virginia Tech’s Review of Successful Projects

- Review of watershed plans by DC Office of EPA

- How can EPA and States promote more successful projects?

Towards Understanding New Watershed Initiatives - Madison Workshop 2000

External Factors for Success: (hard to affect at first)	**Internal Factors:**
Ecological setting and use problem Demographics/ Socio-economics Situation history Issue salience Regulatory/ Programmatic context	✓Partnership initiation Clarity of purpose Organizational process ✓! Leadership ✓! Staffing (coordinator) ✓Govt commitmt/suppt. ✓! Funding ✓! Watershed plans

Watershed Plans (2000 Madison Report)

- Convergence of opinion that "watershed plans are necessary precedents for successful watershed management, protection, and restoration interventions.."

- In a recent study,.. "the use of watershed plans was the only factor with a high correlation with potential positive environmental outcomes." (Trout Unlimited & Pacific Rivers Council)

TMDL Implementation – Characteristics of Successful Projects – Virginia Tech May 2006

- Method
  - State and EPA Regional TMDL programs were contacted for successful projects
  - Section 319 Success Stories were studied
  - Data level was assessed and documents were reviewed
  - Factors identified that aided or hindered success (including types of plans)

Case Study Watersheds (V.Tech)

Lake Allegan MI	Lwr. Nooksack R. WA
Aquilla Reserv. TX	NF of S. Branch WV
Cascade Res. ID	Quail Run VA
Clear Creek TX	Slip Bluff Lake IA
Deep Creek MT	S. Platte R. CO
Hutton Creek VA	Swan Lake AK
Medicine Ldge. Ck ID	Truckee River NV
James River MO	Lwr. Yakima R. WA
Nine Eagles Lake ID	

Factors that influenced successful implementation:

Enhanced Implementation	**Hindered** Implementation
✓Existence of a watershed plan (focused & achievable) ✓Active involvement of stakeholders ✓Coordination of local and state government ✓Diversity of approaches ✓Adequate resources for voluntary incentives and technical assistance	✓Lack of resources ✓Lack of sufficient data to characterize pollutant sources ✓Lack of data to characterize WQ improvement ✓Lack of communication and coordination between agencies ✓Lack of funding particularly mid-project cuts

Additional Lessons Learned (VT, 2006)

- Developing an implementation plan at the same time the TMDL is developed builds on stakeholder involvement.
- Existence of watershed activist group with strong local citizen base promotes implementation
- Human resources are needed to educate, manage projects, and implement corrective action
- Responsible party to execute and track implementation.
- 319 funding was found in most surveyed projects Yeah!

Nine Elements of a Watershed -based Plan for NPS Mgmt.

a. Thou shalt know thy sources needing actions to achieve Load reductions

b. Thou shalt estimate thy load reductions expected for the management measures described under paragraph (c) below.

c. Thou must describe thy NPS management measures needed to achieve the load reductions and identify them with a map or a critical areas description.

d. Thou shalt estimate the amounts of technical and financial assistance needed, costs, and authorities that will be relied upon, to implement this plan.

e. Thou shalt include an information/education component that will be used to enhance public understanding of the project and encourage early and continued participation.

f. Remember thy reasonably expeditious schedule for implementing the NPS management measures.

g. Honor thy measurable milestones. (barring Acts of you know who.)

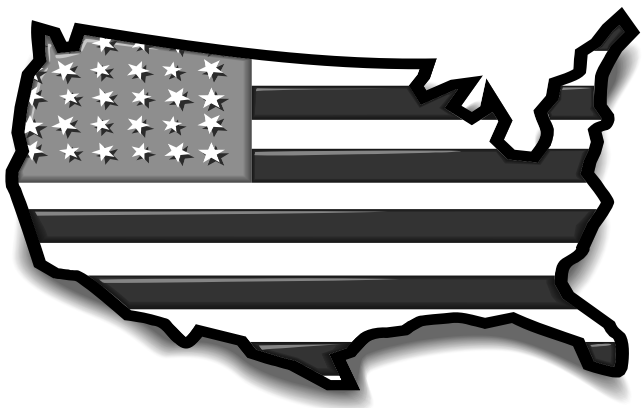
h. Thou shalt have a set of criteria that can be used to determine whether load reductions and water quality standards are being achieved and, if not, what is to be done.

i. Lastly, remember thy monitoring component to evaluate the effectiveness of the implementation efforts, measured against criteria in (h).

A 10th ??.

CWA, Section 3:19

- Samples from watershed plans from around the country that are addressing the EPA planning elements for 319 Funding.



Discussion

- State coordination approaches? Watershed Councils?
- Level of detail needed for watershed assessment and implementation planning?
- Where are watershed organizations getting expertise for assessment and BMP performance estimates?
- How can NPS programs assist?

NINE Elements of watershed-based nonpoint source pollution control plans

A. Identification of causes and sources, listed waters, pollutants, loads by watershed sub-categories, (crops, AFOs, urban, forestry, etc.)
B. Estimate of load reductions by land use (or other) subcategories expected from BMPs
C. Description of BMPs, How they are targeted (map suggested)
D. Estimate of needed technical & financial resources
E. Information/ Education component
F. Schedule (who does what, when)
G. Description of measurable milestones for implementation
H. Criteria to determine if loadings/ targets are being achieved
I. Monitoring component for above criteria

Element A: Source ID, Current Loadings

- Minnesota:

The South Branch Watershed

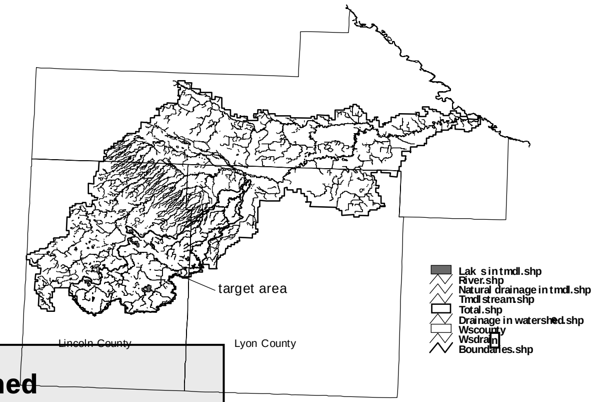


Table 1.1 Inventory of Fecal Coliform Producers in the South Branch TMDL Watershed

Category	Sub-Category		Animal Units	Number
Livestock	The basin contains an estimated 93 livestock facilities ranging in size from 1 animal units to 733 animal units	Dairy	1757	
		Beef	4916	
		Swine	1737	
		Sheep	567	
		Chicken	31	
		Horse	45	
Human	Rural Population with Inadequate Wastewater Treatment*			909
	Rural Population with Adequate Wastewater Treatment			271
	Municipal Waterwater Treatment Facilities			1
Wildlife	Deer (average 10 per mile)			1218
	Other It was not possible to obtain estimates for other wildlife. This sub-category was estimated using an equivalency to deer in the basin.			
Pets	Dogs and Cats in Urban Areas**			812
	Dogs and Cats in Rural Areas***			618

* 77% non compliant

** 1550 people / 2.5 people/household, 0.58 dogs/household, .73 cats/household

*** 1180 people / 2.5 people/household, 0.58 dogs/household, .73 cats/household

Minnesota – SB Watershed

- "Bacteria Matrix" Spreadsheet Method

Contributions from Point and Non-Point Sources

Category	Source	Contribution Wet	Contribution Dry
Livestock	Overgrazed Pasture near Streams or Waterways	4%	32%
	Feedlots or Stockpiles without Runoff Controls	18%	
	Surface Applied Manure***	63%	
	Incorporated Manure	13%	
Human	Failing Septic Systems and Unsewered Communities	2%	66%
Wildlife	Deer	0.3%	3%
Pets	Dogs and Cats	0.4%	
Total		100.00%	100.00%

Percent Reductions Necessary to Meet TMDL Allocation

			All sources reduce equally				
			RS1	RS1	RS1	RS1	Reduction
	Wet	Dry	Wet	Wet	Dry	Dry	GOALS
Sources:	[assumed	shares]	x	Concen.	x	Concen.	(1-x)
Overgrazed Pasture	4%	32%	22%	7	20%	6	78%
Feedlots/Stockpiles	18%	63%	22%	31	100%	60	78%
Surface Applied Manure	63%	0%	22%	110	20%	0	78%
Incorporated Manure	13%	0%	22%	22	100%	0	78%
Failing Septic Systems	2%	66%	22%	3	20%	12	78%
Wildlife**	0.3%	3%	100%	2	100%	3	0%
Pets	0.4%	0.0%	22%	1	100%	0	78%
	100%	100%					
			Conc	177		81	
			goal	180		180	
			WQG	200		200	

Element B: Load Reduction Estimates

- Oklahoma: Ft. Cobb Watershed
  - 70% Phosphorus Reduction Goal
  - SWAT Model Scenario Analysis

Practice	Resulting P Load Reduction
No-Till wheat and other crops	34 %
Convert 20% worst cultivated land to pasture	25 %
Riparian Buffer in 100% of the watershed	50 %
Nutrient Management Plan for all producers	35 %
Grade Stabilization Structures for erosion	Unknown
Total Reduction Rate	84 %

Option 2: Practice	Resulting P Load Reduction
60% No-Till wheat and other crops	20 %
Convert 15% worst cultivated land to pasture	18 %
Riparian Buffer in 75% of the watershed	40 %
Nutrient Management Plan for 70% producers	24 %
Grade Stabilization Structures for erosion	Unknown
Total Reduction Rate	70 %

Option #3: Lower investment, same reductions

Option 3: Practice	Resulting P Load Reduction
50% No-Till wheat and other crops	17 %
Convert 20% worst cultivated land to pasture	25 %
Riparian Buffer in 60% of the watershed	30 %
Nutrient Management Plan for 90% of producers	32 %
Grade Stabilization Structures for erosion	Unknown
Total Reduction Rate	70 %

Figure 6. Location of areas in Fort Cobb Watershed most likely contributing the greatest portions of total sediment, and therefore phosphorus loading.

Fort Cobb - priority areas for phosphorus management based on SWAT modeling

Element B: Load Reduction Estimates

- Tennessee – Crab Orchard Creek
  - Acid Mine Drainage   -Spreadsheet Model

Table 3-1. Crab Orchard Creek Watershed AMD Site Reclamation Measures.

AMD Site(s)	Subwatershed	Reclamation Measures	Expected Lifetime
Eddie Walls (1A and 1B)	Golliher Creek	2 limestone treatment ponds	32/52 years
		1 wetland	Indefinite
		Regrade/revegetate	Permanent
Fagan Mill	Fagan Mill Creek	1 limestone treatment pond	61 years
		1 wetland/settling pond	Indefinite
Little Laurel Highwall	Crab Orchard Creek 03 (A and B) Little Laurel Creek	Backfill ponds and highwall	Permanent
		Regrade/revegetate	Permanent
Mine Field	Crab Orchard Creek 03 (A and B) Little Laurel Creek	2 limestone treatment ponds	31/34 years
		1 wetland/settling pond	Indefinite

Spreadsheet Method Example

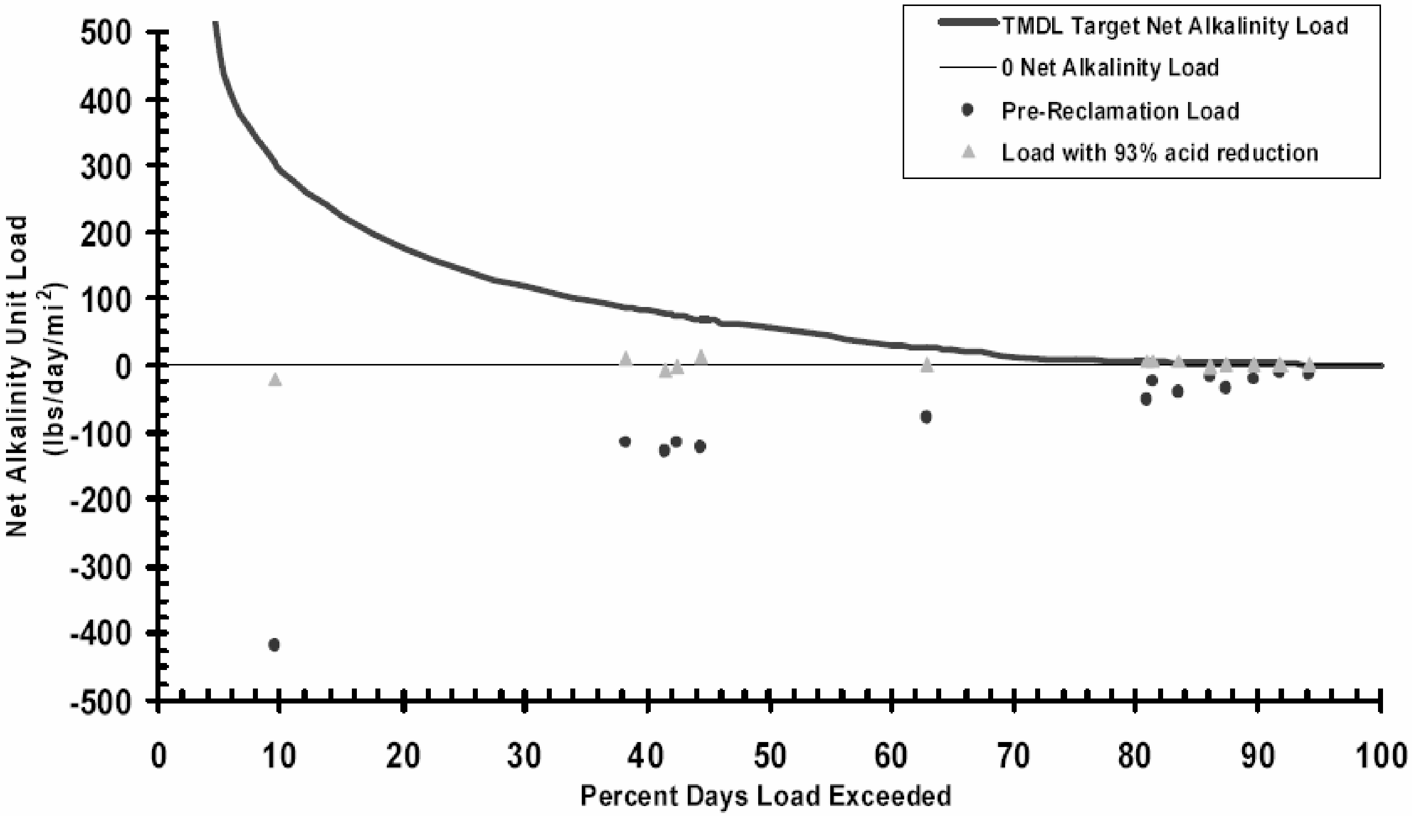


Figure 3-1 Estimated post-reclamation net alkalinity loads at Golliher Creek. Pre-reclamation loads using data collected from 10/5/99 through 6/20/00, and target loads set by the TMDL are also shown.

Element C: NPS Management Measures

- Maryland – Corsica River Watershed

TABLE 5

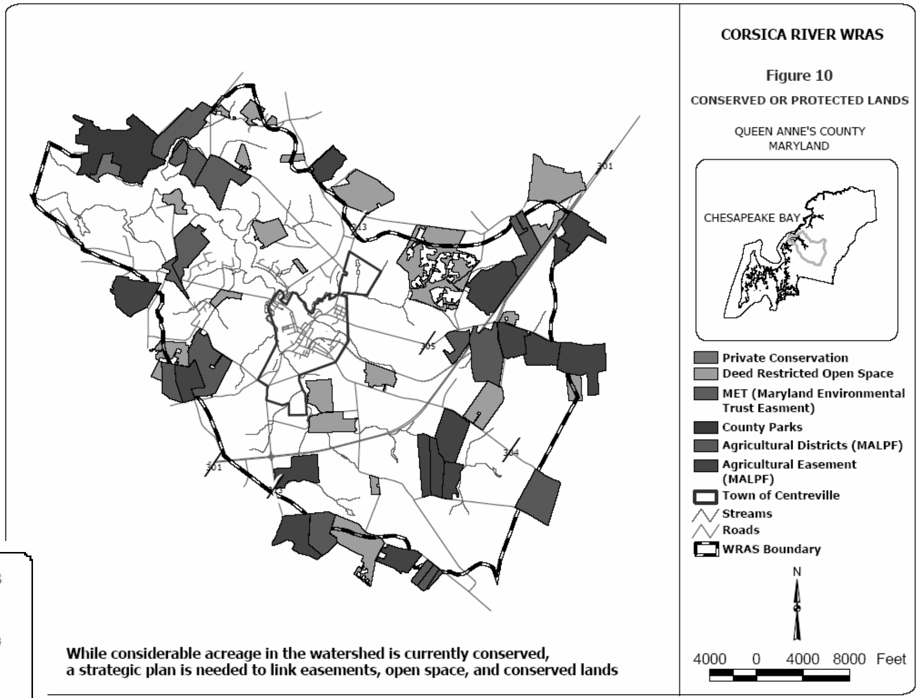
Summary of Implementation Project Costs and Reductions			
Best Management Practice (BMP)	Goal	Cost	Nutrient Reduction/Lbs.
1. Nutrient Uptake	3,000 acres	$90,000.00	21,000 N, 570 P
2. AG Nutrient and Sediment Reducing Buffers	100 acres	($170/ac + staff) $67,000.00	9,188 N, 792 P
3. Whole Farm Nutrient Management and Horse Pasture Management	5 projects	($25,000.00/site) $125,00.00	15,977 N, 1,944 P
4. Household Pollution Reduction	400 acres	$3,696.00	634 N, 118P
5. Main Stem of the Corsica River: Water Quality Monitoring		$345,434.00	
6. Submerged Aquatic Vegetation (SAV) Reestablishment		$48,000.00	
7. Low Impact Development Technique in Ordinance Form		Ordinance $37,000.00/Regional BMPs $272,385.00	2,668 N, 236 P
8. Native Conservation Landscaping Demonstration Project		$78,410.00	Est. 70% Reduction
9. Easements Incentive Program	1,710 acres	($2,437.00 ac.) $4,167,270.00	
10. Creation of Non-Agricultural Wetlands		$22,000.00	
11. Septic System Retrofits		$141,000.00	28,905 N
12. EcoTeams		$93,500.00	
13. Turbidity Reduction		(cost for first 10 ac.) $145,000.00	
Total with All Programs, Complete		**$9,423,320.00**	
Total without Easements (9) and Total Septic Conversion (11)		**$1,378,550.00**	

Vegetated Buffers

•100 acres
• $170/acre for 15 years

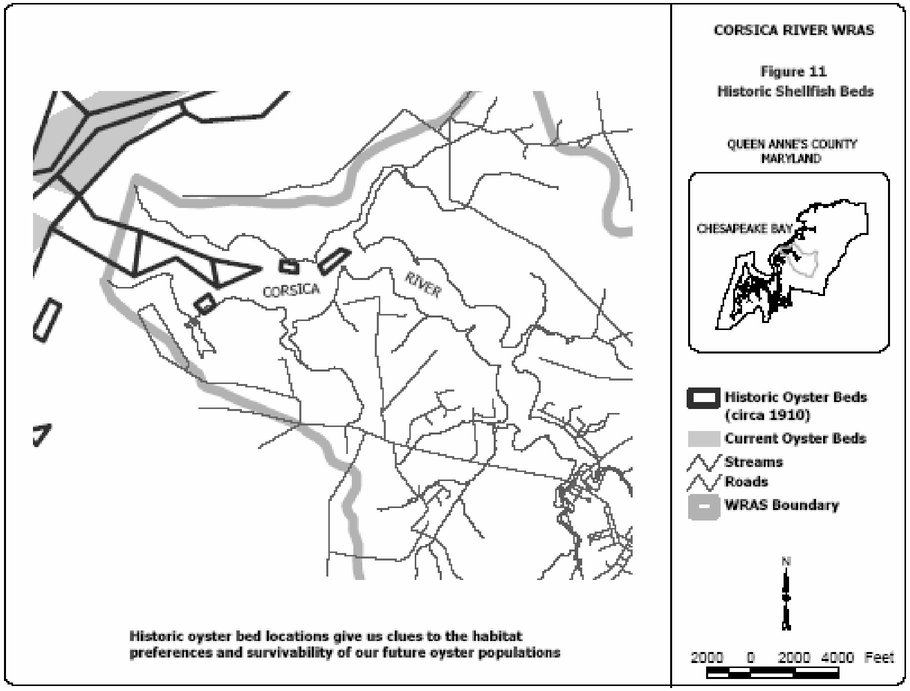
•9,188.46 lbs/acre of N
• 792.40 lbs/acre of P

Conservation Easements



While considerable acreage in the watershed is currently conserved, a strategic plan is needed to link easements, open space, and conserved lands

Oyster Bed Re-Population



Historic oyster bed locations give us clues to the habitat preferences and survivability of our future oyster populations

Nutrient Management

50 Acres Volun. Demonstration
• 5 Farmette Conversion Projects

• $25,000 each
• 14% Nutrient Reduction

Element D: Technical & Financial Assistance

- Oklahoma – Ft. Cobb Watershed Implementation

Table 7. Funding Necessary to Implement TMDL Recommended Practices to Restore Beneficial Use Support to Fort Cobb Reservoir.

Load Reduction		TMDL Recommended BMP	Project/Funding Source	Federal	State/Local	Total
TMDL target	Anticipated from this project					
17%	7%	No-till in 50% of wheat and other row crop	FY 2005 319 Fort Cobb TMDL Implementation	$672,380	$586,754	$1,259,134[4]
	10%		CSP, EQIP, ???			$930,000
25%		Convert 20% of worst cultivated land to pasture	FY 2001 319 Fort Cobb Project			
			EQIP, CSP,???			$2,050,000[5]
30%	1%	Riparian Areas in 60% of watershed	FY 2001 319 Fort Cobb Project	$38,802	$25,867	$64,669
	15%		2005 CREP	$4,726,790	$945,358	$5,672,148
	14%		EQIP, CRP, CSP,???	$4,235,204	$1,058,801	$5,294,005
31.5%	31.5%	Nutrient Management Plans for 90% of producers	FY 2001 and 2005 319 Programs, EQIP, CRP, CSP,???			$375,000[6]
???	???	Grade Stabilization Structures	FY 2001 319 Fort Cobb Project	$92,804	$61,870	$154,674
	???		EQIP,???			
Total						$15,799,630

Element D: Technical & Financial Assistance

- Oklahoma – Ft. Cobb Watershed Technical Support

Table 6. Funding Needs for Technical Support for Implementation of BMPs.

Project/Funding Source	Task	Federal	State Cost Share Funds	Total
FY 2001 319 Fort Cobb Project- five year period	On-Site Coordinator	\$225,000		\$225,000
	Plan Writer	\$80,000		\$80,000
	District Support	\$75,000		
FY 2005 319 Fort Cobb TMDL Implementation Project- salaries and support for 2 years beyond 2001 project	On-Site Coordinator	\$121,000		\$121,000
	District Support	\$15,000		\$15,000
Conservation Reserve Enhancement Program (CREP)- funding for 2-3 years of technical support	Plan Writer		\$94,000 - \$312,000	\$94,000 - \$312,000
NRCS District Conservationists (3)		\$52,000 - \$85,000[3]		\$52,000 - \$85,000
	Total	**\$609,800 - \$642,800**	**\$94,000 - \$312,000**	**\$703,000 - \$954,800**

Element D: Technical & Financial Assistance

Table 8.2 Millers Creek Recommended Monitoring Plan and Costs

Item	Stations	Monitoring Frequency	Five Year Cost	Annual Cost	10 yr cost
Benthic Monitoring	8	3 sites/yr		$3,600	$36,000
Habitat Monitoring	8	4 sites in yrs 4,5,9,10	$7,500		$15,000
Rating Curve Adjustments	6	3 sites/3 yrs starting in 2005		$11,344	$34,000
Geomorphic Measurements	5	2 sites/4 yrs starting in 2006		$8,700	$17,400
Transducer Flow Data	2	2 sites in yrs 1,4,5,9,10		$10,000	$50, 000
Water Quality	5	Once every 5 yrs	$20,000		$40,000
Website	NA	NA		$3,500	$35,000
		Annual Total		Total 10 year Cost	$227,400

Element F: Schedule

- Texas – Aquilla Reservoir Watershed

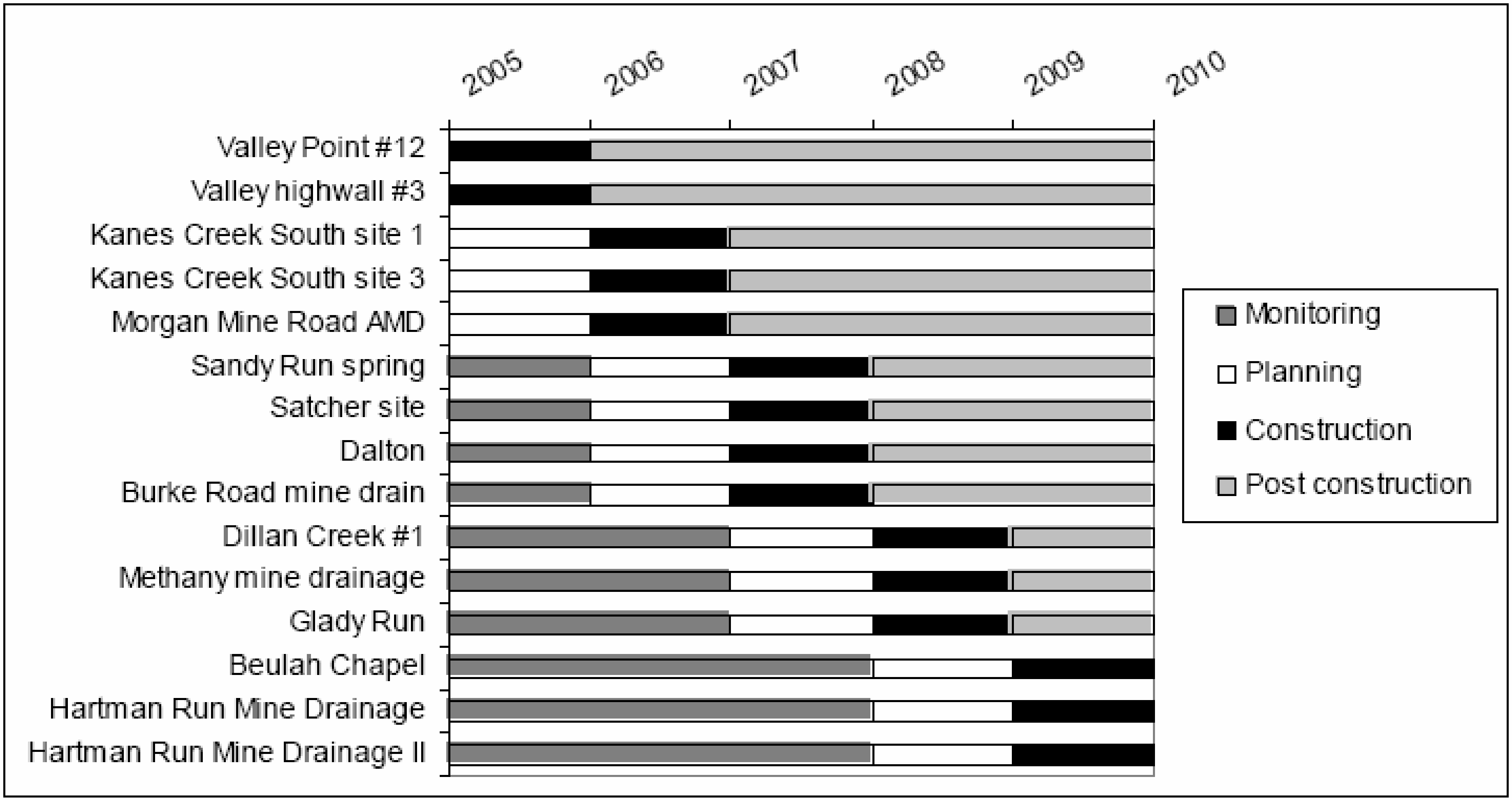
Table 1. Implementation Schedule

Entity	Activity	Schedule
Phase I		2000 - 2004
TSSWCB	319(h) -WQMP program	7/2000 thru 4/30/2002
TSSWCB	Tributary stormwater and sediment sampling	2001 thru 2004
TNRCC	Monthly atrazine sampling in reservoir	started 3/2001; ongoing
TDA	BMP effectiveness study (subject to available funding) Ongoing enforcement of label restrictions	May, 2001
TDA/TSSWCB/ TNRCC/ TAEX	Educational Outreach/ CEU Meetings	ongoing
Phase II		2005 - 2008
TSSWCB	WQMPs revised to include more extensive BMPs	2005-2008
TSSWCB	Request funding for secondary cost share payments	2005
TSSWCB/TAES/ TCE	Tributary stormwater and sediment sampling	ongoing
TNRCC	Monthly atrazine sampling in reservoir	ongoing
TDA	Intensified enforcement of label restrictions	2005-2008
TDA/TSSWCB/ TNRCC/ TAEX	Educational Outreach/ CEU Meetings	ongoing
Phase III		2009 - 2010
TSSWCB	WQMPs revised to include more extensive BMPs	2009-2010
	Tributary stormwater and sediment sampling	ongoing
TNRCC	Monthly atrazine sampling in reservoir	ongoing
TDA	Reclassify atrazine as a state-limited use pesticide	2009-2010
TDA/TSSWCB/ TNRCC/ TAEX	Educational Outreach/ CEU Meetings	ongoing

Element F: Schedule

◆ West Virginia – Deckers Creek Watershed

Figure 20: Implementation schedule for high-priority AMD sources



Element G: Milestones

- West Virginia – Deckers Creek Watershed

Table 17: Expected improvements in stream segments due to remediation activities

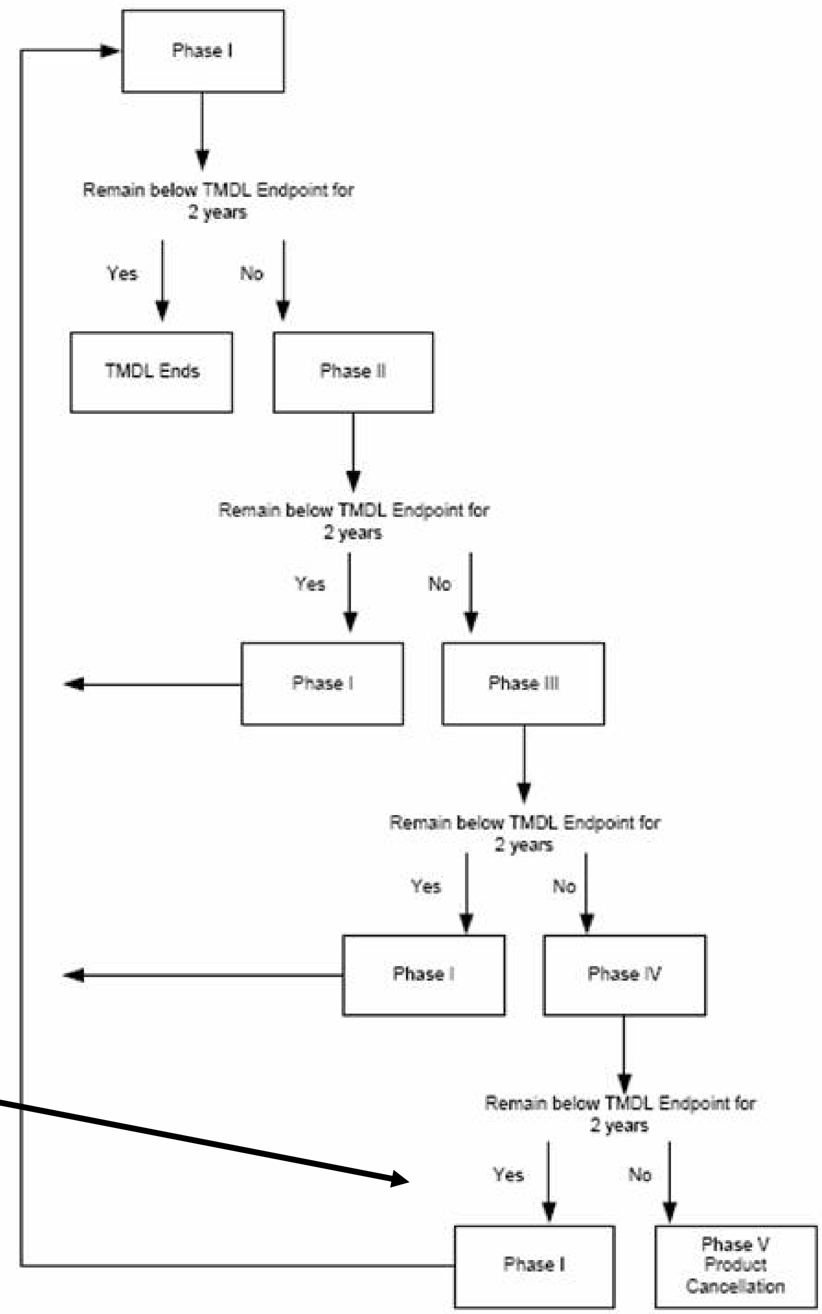
Subwatershed	Segments	Projects causing improvement	Expected year for improvement		
			Meets standards	*Improved WVSCI*	*Improved fish communities*
Kanes Creek	Mainstem above RM 3.2	Valley Highwall #3	2006	2007	2008
	UNT RM 3.2, above contribution from Kanes Creek Tipple	Valley Point #12	2006	2007	2008
	Mainstem above RM 2.6	Kanes Creek Tipple	2007	2008	2009
	Entire subwatershed	Clinton Braham, Sandy Run spring, Morgan Mine Road AMD, Hawkins Mine Drainage, Kanes Creek South	2008	2009	2010
Laurel Run	Entire subwatershed	Burk Mine Drain	2008	2009	2010
Deckers Creek	Mainstem above Dillan Creek	Dalton site, and Kanes and Laurel subwatersheds	2008	2009	2010
Dillan Creek	From headwaters to Swamp Run	Dillan Creek #1	2009	2010	2011

Element H: Evaluation Criteria

Texas – Aquilla Reservoir Adaptive Management Scheme

If, not attaining targets after phase 4, then product registration will be cancelled!

FIGURE 1. Phased Implementation Process



Element I: Monitoring

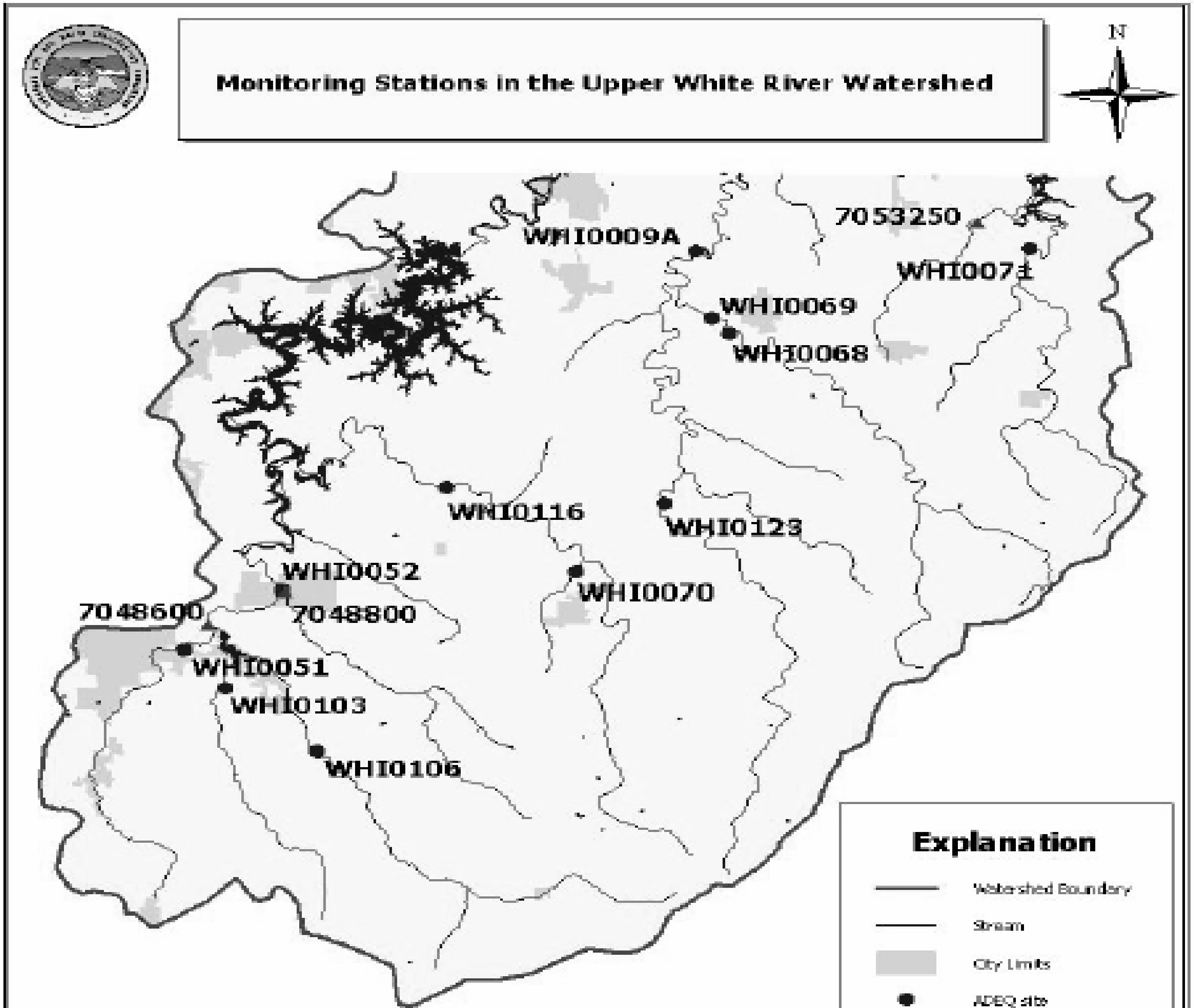
◆ Minnesota – South Branch Watershed

Sampling Schedule 2006-2010

Week Starting Monday	Trib 100	Trib 101	Event 300
			Sample Series
Snow Melt	1	1	
			***note: try to collect 6 storm events**
Apr-7	1		
Apr-14			
Apr-21	1	1	
Apr-28			
May-5	1		
May-12			
May-19	1	1	
May-26			
Jun-2	1		
June-9			
Jun-16	1	1	
Jun-23			
Jun-30	1		

Element I: Monitoring

- Arkansas – Upper White River Watershed



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More lessons learned:

http://resources.ca.gov/watershedtaskforce/lessons.pdf

State Perspectives on Water Quality Restoration

Plenary Session

– Ann Butler, Washington Department of Ecology
  - Restoring Water Quality in Several Washington Watersheds

– Rich Gannon, North Carolina Division of Water Quality
  - The Tar – Pamlico Nutrient Strategy

Quantifying Problems & Solutions
Plenary Session

- Barry Evans, Penn State University
  - Using AvGWLF at the State and Regional Level
    - – 45 Minutes
- Cross Programmatic Issues
  - Kathy Hernandez – Region 8 – OSWER
  - Mike Haire – DC Watershed Branch
    - – 15 Minutes